REMARKS

Status the Claims: Claims 1-22 are pending in the application.

Claims 1-4, 7-9, 12, 13, 16, 17, 21 and 22, which were rejected, are submitted for reconsideration.

Claims 5, 6, 10, 11, 14, 15 and 18-20 were objected to as being dependent upon a rejected base claim, with Examiner's indication that they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Rejections

The present patent application is concerned with technology wherein, as the application provides at page 10, lines 27-30: "The informational content of the video generated by the Terrain Map is the basis for all image analysis techniques of the present invention and results in the generation of several parameters for further image analysis."

At this point Examiner is requested to read the Declaration of Maurice V. Garoutte, the Applicant inventor who is Chief Technical Officer of the assignee of the application, and to consider carefully the so-called "white paper" appended to the declaration. It is a detailed authoritative report entitled TERRAIN MAP, AN IMAGE SPACE FOR MACHINE VISION. It has the purpose of emphasizing the inventive features, operation, method and advantages of the prsent invention. It explains the ways in which the presently claimed invention differs from the prior art, such as MacCormack et al. ("MacCormack").

Examiner, when Examiner has read the white paper called TERRAIN MAP, AN IMAGE SPACE FOR MACHINE VISION, Examiner will appreciate that Applicant 's invention differs hugely from the disclosure of MacCormack. It only then be understood that the present invention are "two different animals."

Until then, it will be easy for Examiner to misunderstand MacCormack. It will be too tempting to read too much into the use of the work "map" by MacCormack, where in reality it is not relate to the use of a terrain map employed by Applicant, as claimed.

Having now presumably read Applicant 's paper TERRAIN MAP, AN IMAGE SPACE FOR MACHINE VISION, Examiner will wish to reconsider claim 1 in light of MacCormack.

Claim 1

Claim 1 is specific and representative broadly of the present invention. It provides:

1. A method for real-time analysis of video image data for subject content, said method comprising the steps of:

(a) performing a single pass through a frame of said video image data; and

(b) generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a plurality of parameters wherein said parameters indicate the content of said video image data.

To recall for convenience, Examiner rejected claim 1 under §102, stating: "MacCormack et al disclose a method for real-time analysis of video image data, said method comprising the steps of: (a) performing a single pass through a frame of said video image data (column 3, lines 28-44); and (b) generating a terrain map from said pass through said frame of said video image data (column 33, lines 11-24, map generator 1124), said terrain map comprising a plurality of parameters wherein said parameters indicate the content of said video image date (column 35, lines 31-45)."

Analysis of MacCormack et al. ("MacCormack")

Examiner must not be misled by the use of the term "map" by MacCormack. It has nothing to do with the presently claimed concept of a terrain map, as here claimed and set forth in claim 1 in particular, and other claims of the application and as described in the present patent application.

The present claims, and specifically as in claim 1, describe a unique way to describe and handle an image, different from image space and color space as those terms have been known in the prior art.

Examiner must here understand that "terrain map" as presently defined and described is a new "space" to describe images.

No recognized name is used in the prior art for the old space, but such extant image formats of the prior art can be though of as brightness maps.

For example, in the prior art, including MacCormack:

- Gray scale images are brightness maps with the value of every pixel coded for the brightness that should be displayed to a human for correct perception of the image.

- RGB (Red-Green-Blue) color images are brightness maps with the value of every pixel coded for the brightness that the Red, Green, and Blue should be displayed to a human for correct perception of the image.

In the prior art, the concept of arranging image formats in brightness maps is so ingrained by industry practice that there is no name for it. In such known image handling and storage practices (including that of MacCormack), the ordinarily skilled artisan assumes that images should be stored in such a way that humans can correctly perceive the image, because after all images are intended for one fundamental purpose: Human perception.

The present application, as the specification observes on page 1, involving methods and apparatus for automated screening of security cameras, as in large-scale security CCTV (Closed Circuit Television) systems depends on a machine understanding the image. It doesn't help to have an image space that is optimized for people. In other words the present invention involves *machine recognition*. The "terrain map" of Applicant 's claims is that for machine recognition. It is of little use to a person. Claim 1 provides for `"real-time analysis"` (line 1) which is in other words machine-implemented analysis, rather than images intended for people to see.

It is fundamentally different from the prior art. In a conventional brightness map, each pixel represents the brightness of that part of the image, and that's all in represents.

As will be entirely clear from Applicant 's patent application and even more understandable after reading of the Applicant's white paper TERRAIN MAP, AN IMAGE SPACE FOR MACHINE VISION, in a "terrain map" as defined in the application, each pixel contains symbolic information describing the conditions of that part of the image in much the same way as a geographic terrain map represents the lay of the land.

By way of explanatory background for Examiner, names of the Terrain Map elements, as set forth in the patent application, are:

- AverageAltitude: an analog of altitude contour lines on a terrain map.
- DegreeOfSlope: an analog of the distance between contour lines on a terrain map. (Steeper slopes have contour lines closer together.)
- DirectionOfSlope: an analog of the direction of contour lines on a map such as a south-facing slope.

- HorizontalSmoothness: an analog of the smoothness of terrain When dragging an object up or down the image.
- VerticalSmoothness: an analog of the smoothness of terrain when dragging an object left or right on the image.
- Jaggyness: an analog of motion blur. The faster objects are moving the higher the Jaggyness score will be. Or in the analog, the faster things are moving, the more noticeable the motion blur.

With specific concern for Applicant's claim 1, the MacCormack patent fails to teach anything remotely akin to the "terrain map" of Applicant's invention. The disclosure of MacCormack carries with it the tacit assumption that video frames are brightness maps. The term brightness map to describe a video frame has not been required heretofore, for it is true that images in the current start of the art, as derived from video, for example, as in MacCormack, are brightness maps.

Examiner refers to MacCormack column 3, lines 28-44, which discuss a block diagram of a means to handle conventional brightness maps. MacCormack does not introduce any new image space.

Examiner refers to MacCormack column 33, lines 11-24, which text describes Figure 39 which is a block software diagram where the word "map generator" is used (1124). The map generator of figure 39 referenced as a functional software block with no reference to an image space. It has nothing to do with the concept a "generating a terrain map" as presently claimed.

Examiner refers to MacCormack column 35, lines 31-45, which text describes Figure 44 where the map generator is clearly shown to be a *map of differences* between two fields of video. No new image space is described in the description of the "map generator" and no relation is found to a "terrain map" as presently claimed.. The MacCormack does not refer to the reference field and difference fields as brightness maps but that necessarily is the case according to the current state of the art, apart from Applicant's "terrain map."

In reality, known extant image formats are brightness maps that have been optimized for presentation to a human viewer. The concept of a "terrain map" in the method set forth in claim 1 is a new and unique image space that has been optimized for machine readability.

Examiner should note that MacCormack is concerned with image *movement* and, further, with thereafter presenting images in which there is movement to a human viewer and for archiving. This is easily seen from the MacCormack Abstract of the Disclosure which provides: "In an intelligent video information management (IVIM) system, a first sequence of dynamic video images is generated by a first video camera on a first occasion and is recorded on a hard disk. The same camera, or a different camera, generates a second sequence of dynamic video images on a second occasion that is later than the first occasion, and the second sequence is recorded on the hard disk. Both sequences are reproduced from the hard disk and are displayed simultaneously. Alternatively, the first sequence is reproduced and displayed while the second sequence is being recorded."

The only analysis provided by MacCormack is to determine image *movement*. The MacCormack patent provides:

"According to another aspect of the invention, there is provided a video information storage and analysis apparatus, including a video information source for generating a dynamic sequence of video data frames, a compression circuit for applying a data compression algorithm to the dynamic sequence of video data frames to form compression video data, a display device for displaying a dynamic image which corresponds to the dynamic sequence of video data frames, an analysis circuit for receiving the dynamic sequence of video data frames and performing a moving image content analysis algorithm with respect to the received dynamic sequence of video data frames, and signal transmission circuitry for simultaneously transmitting the dynamic sequence of video data frames from the video information source to all three of the compression circuit, the display device and the analysis circuit. "

Applicant submits that the parameters sensed in the MacCormack arrangement do not "indicate the content" but rather indicate movement of image data content.

Accordingly, there is no anticipation by MacCormack of Applicant's claim 1. MacCormack also falls completely short of suggesting Applicant's claimed invention.

Claim 2

As claim 2, Examiner states that "MacCormack et al disclose the method according to claim 1 (see claim 1 above), wherein said parameters are generated by color space calculations (Fig. 38, 1086), said color space calculations comprising a color degree parameter which measures how far a color is from gray scale (column 32, lines 20-33)."

Applicant submits that claim 2 is not only allowable based on dependency from claim 1, but also because the claim sets forth a feature unsuggested by MacCormack, in reciting the

method of claim 1 wherein "parameters are generated by color space calculations, said color space calculations comprising a color degree parameter which measures how far a color is from gray scale."

Nothing of corresponding significance is taught or suggested by MacCormack. The MacCormack patent does not teach anything remotely akin to new color space as described in the Cernium Patent application. It is simply the case that MacCormack describes a unique means to utilize well known standard color spaces RGB and YUV. For example, in MacCormack Figure 38, block 1086 marked "COLOR SPACE CONVERSION" shows conversion from YUV to RGB, but such conversion is by itself well known in the art. Both YUV and RGB (sometimes used as the acronym "RBG") are standard color spaces. The concept of using color space calculations comprising "a color degree parameter which measures how far a color is from gray scale" is new in the present method as involving a new color space optimized for machine analysis, and is not taught or even hinted at in MacCormack.

The MacCormack description at column 32, lines 20-33, to which Examiner refers, further describes the conversion between YUV and RGB color spaces. There is no hint of a new color space. Even though the output of such conversion is intended for machine analysis, the MacCormack is not concerned with the weakness of YUV and RGB color spaces that have been for so long optimized for human perception.

Claim 3

As claim 3, Examiner states that " MacCormack et al disclose the method according to claim 1 (see claim 1), wherein said parameters are generated by color space calculations, said color space calculation comprising a color direction parameter which measures color based on a two-dimensional color analysis (column 26, lines 1-14)."

Applicant submits that claim 3 is not only allowable based on dependency from claim 1, but also because the claim sets forth a feature unsuggested by MacCormack, in reciting the method of claim 1 wherein "said parameters are generated by color space calculations, said color space calculations comprising a color

direction parameter which measures color based on a two-dimensional color analysis."

But the MacCormack patent does not teach anything remotely akin to the new color space described in the Applicant's application, and here claimed as having color space calculations comprising a color direction parameter which measures color based on a two-dimensional color analysis. MacCormack describes a proposed new means to utilize only well known standard color spaces RGB and YUV.

It will assist Examiner to recall that RGB is the best known of the color spaces. It is simply a brightness map of the pixels with a brightness byte for each of the three colors Red, Green, and Blue. When a RGB brightness map is transferred to an image it is readily perceived by humans as a color image. A machine does not so easily understand it.

YUV is a well-known color space. The YUV color space is intended to minimize the storage space used by image and is based on human perception being less sensitive to color information than to intensity. Therefore the YUV color space uses less storage space for the color information than RGB.

The text of MacCormack referenced by Examiner at column 26, lines 1-14, describes yet another means of coding a YUV color space. It does not anticipate claim 3 or suggest these method features wherein, advantageous, a new color space optimized for machine analysis.

Claim 3 is accordingly allowable over MacCormack as neither taught nor suggested by that reference.

Claim 4

Examiner has stated that

> As to claim 4, MacCormack et al disclose the method according to claim 1 (see claim 1).
>
> But MacCormack does not disclose expressly an average altitude parameter which measures an average value of four pixels in the center of a 2.times.2 kernel in said frame of said vide image date.
>
> Brady et al disclose average altitude parameter which measures an average value of four pixels in the center of a 2.times.2 kernel in said frame of said vide image data (col. 12, lines 34-46).
>
> MacCormack et al and Brady et al are combinable because they are form same field of endeavor of tracking object in images provided by real time video.
>
> At the time of the invention, it would have been obvious to a person of ordinary skill in the art to measure an average value of four pixels in the center of a 2.times.2

kernel in said frame of said vide image data of Brady et al with MacCormack et al to reduce the resolution of a region of interest (column 12, lines 34-36).

The suggestion/motivation for doing so would have been to reduce the data to increase the speed of processing the information of tracking (column 12, lines 34-36).

Therefore, it would have been obvious to combine Brady et al with MacCormack et al to obtain the invention as specified in claim 4.

Applicant believes Examiner's comments are referenced to conventional brightness maps. If the present invention hinged on the difference between a brightness map with one value per pixel or one value per four pixels Examiner would be on better ground. In its reciting that the "parameters further comprise an average altitude parameter which measures an average value of four pixels in the center of a 2x2 kernel in said frame of said video image data," the term "average altitude" of Claim 4 is in the context of a terrain map, which is a new, and unique image space neither taught nor suggested by MacCormack. See the remarks above about claim 1. Neither MacCormack nor Brady anticipate such features within a new image space that is optimized for machine analysis.

Claim 4 is accordingly allowable over MacCormack taken with Brady as unsuggested by them.

Claim 7

Examiner stated that "As to claims 7 and 8, MacCormack et al disclose a horizontal smoothness parameter which measures a consistency of change in horizontal direction from a lowest pixel to a highest pixel in said frame of said video image data (column 28, lines 43-55)."

Claim 7 provides that the "parameters further comprise a horizontal smoothness parameter which measures a consistency of change in horizontal direction from a lowest pixel to a highest pixel in said frame of said video image data."

These features should be allowable with claim 1. Applicant notes that Examiner's remarks may well be referenced to conventional analysis of conventional brightness maps. But here, the horizontal smoothness parameter of claim 7 is in the context of the requirement of claim of a method of "generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a plurality of parameters wherein said parameters indicate the

content of said video image data." Generating such a "terrain map" provides a new and unique image space that is optimized for machine analysis. See the remarks regarding claim 1. Neither MacCormack nor Brady suggest a method step as in claim 7 carried out in that context, intended for machine analysis.

Claim 7 is accordingly allowable in the application as undisclosed and unsuggested by MacCormack.

Claim 8

Examiner states that "MacCormack et al disclose a horizontal smoothness parameter which measures a consistency of change in horizontal direction from a lowest pixel to a highest pixel in said frame of said video image data (column 28, lines 43-55)." But the requirement of claim 8 that the "said parameters further comprise a vertical smoothness parameter which measures a consistency of change in vertical direction from a lowest pixel to a highest pixel in said frame of said video image data" must be considered as being within the context of generating a "terrain map" as according to claim 1, providing the advantage of a new and unique image space that is optimized for machine analysis. The technique of MacCormack is not combinable with the claimed method.

Claim 8 should thus similarly be allowed in the application.

Claim 9 additional provides in the method of claim 1 that the "parameters further comprise a jaggyness parameter which measures an offset in pixels between odd and even fields for a target segmented from said frame of said video image data." Examiner, on the other hand, has said that " MacCormack et al disclose a jaggyness parameter which measures an offset in pixels between odd and even fields for a target segmented from said from video image data (col. 46, lines 28-64)."

That seems to read too much into MacCormack, because at column 46, lines 28-64, its description does not discuss the differences between fields in any respect. It teaches that the capture of only one of two fields is adequate for surveillance applications. The concept of "jitter" is mentioned but jitter is not related to the presently claimed method or parameter involving "Jaggyness". By comparison, jitter (as considered in MacCormack) is random changes

in timing between frames while "jaggyness" is an orderly series of inter-field differences due to motion in the frame, as is evident from Applicant's disclosure. "Jaggyness" can be considered as a metric of interlaces distortion sometimes referred to as "comb effect". Interlace distortion is generally considered an undesirable side effect of motion in a video. By way of explanation, Applicant's invention involves an algorithm to quantify the interlace distortion and make it a useful metric of motion.

It is believed accordingly that claim 9 is allowable with claim 1, as unsuggested by MacCormack.

Claims 12 and 13

These claims should be allowable with claim 1. While MacCormack is concerned with detection of motion in captured video, so as to know what to display and archive, there is otherwise no relation to a method according to claim 1. The method according to Claim 1 (Terrain Maps) are not by the current state of the art. Although with analysis of conventional brightness maps many schemes are known to detect events, there is otherwise no overlap or combinable relationship with the method of claim 1 including "generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a plurality of parameters wherein said parameters indicate the content of said video image data.".

Claims 12 and 13 thus are believed patentable in the application.

Claim 16

Applicant's claim 16 defines the invention essentially according to claim 1 but with additional limitation finding no correspondence in MacCormack. It provides:

16. A method for real-time analysis of video image data, said method comprising the steps of:

(a) performing a single pass through a frame of said video image data; and

(b) generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a color space calculation wherein said color space calculation comprises:

a color degree parameter which measures how far a color is from gray scale; and

a color direction parameter which measures color based on a two-dimensional color analysis.

Examiner used the same theory of rejection as for claims 1-3. Applicant's remarks above for claims 1, 2, and 3 apply. For the reasons set forth, claim 16 is submitted to be clearly and properly allowable in the application.

Applicant additionally observes that the current state of art, of which MacCormack is a part, does not teach any other image space than brightness maps. Applicant points out that:

- Gray scales are known to the art. They have one value for the brightness for every pixel.
- RGB images are known to the art. They have three values for the brightness for every pixel, one for Red brightness, one for Green brightness, and one for Blue brightness.
- YUV images are known to the art. They have one value for the brightness for every pixel and two values for the differences in brightness between the colors and luminosity.

The extant image spaces are intended for and are good for presentation for human perception.

But Applicant's methodology involving generating a "terrain map" is new and unsuggested by the art. The terrain map is a new image space. According to the preferred methodology and system of the invention, a "terrain map" has eight values for each pixel. Each pixel of a "terrain map" consists of a structure with all eight elements, namely

1. AverageAltitude which is like brightness in a gray scale image space.
2. DirectionOfSlope which has no analog in any extant image space.
3. DegreeOfSlope which has no analog in any extant image space.
4. DirectionOfColor which has no analog in any extant image space.
5. DegreeOfColor which is similar the Saturation value is the Hue Saturation Intensity color space.
6. HorizontalSmoothness which has no analog in any extant image space.
7. VerticalSmoothness which has no analog in any extant image space.
8. Jaggyness which has no analog in any extant image space.

Applicant points out that generating a "terrain map" does not involve a compression scheme. Where an RGB buffer has three bytes per pixel, the terrain map according to the present description uses8 bytes per pixel.

The inventive methods and system involving a terrain map is not a better way to show images to people. Rather it is for machine vision. A considerable amount of software is require to display up to three elements of a terrain map of the invention to a human.

Terrain maps according to the present invention have proven by Applicant's assignee to be quite beneficial in aiding machines to analyze video.

In summary, we are here dealing with inventive features not at all taught or suggested by MacCormack or that reference combined with Brady or other art cited.

Claim 16 is patentable thereover.

Claim 17

Examiner has rejected claim 17 over Brady et al. ("Brady") under §103, and stated:

> Brady et al disclose computer system for automated screening of security cameras, said computer system in communication with a plurality of video cameras and comprising real-time image analysis components wherein video image data from said video cameras is analyzed by said image analysis components and said video image data is then selectively presented to an operator for security monitoring (columns 3, lines 61-Column 4, line 9. Although Brady does not expressly disclose screening of security cameras. But Brady is concern with traffic management and generated alarm. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Brady invention in security field.

Claim 17 has been cancelled and replaced by a new claim 18, which provides:

23. A computer system for automated screening of security cameras, said computer system in communication with a plurality of video cameras and comprising real-time image analysis components wherein video image data from said video cameras is analyzed by said image analysis components and said video image data is then selectively presented to an operator for security monitoring, said system providing real-time analysis of said video image data for subject content and including:

(a) provision for performing a single pass through a frame of said video image data; and

(b) provision for generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a plurality of parameters wherein said parameters indicate the content of said video image data.

Brady is indeed relevant to the field of the invention, and contemplates business uses that are similar to those achievable by the presently claimed system. But Brady does not teach or suggest the present system, now set forth in claim 18, including the features of subparagraphs (a) and (b) which closely conform to the features of method claim 1. For the reasons set forth above in considerable detail relative to claim 1, neither MacCormack nor Brady nor their combination provide such a system, including the features of provision for performing a single pass through a frame of said video image data; and provision for generating a terrain map from said pass through said frame of said video image data, said terrain map comprising a plurality of parameters wherein said parameters indicate the content of said video image data.

In this regard, Brady is a "pixel system" which uses and applies fuzzy set theory to to location and angles of each pixel after pixel intensities have been characterized by vectors. A neural network interprets the data created by the fuzzy set operators and classifies objects within a roadway scene.

Thus, in no sense is there correspondence to terrain map generation, as according to the present claims, wherein the parameters of the terrain map indicate the content of video image data.

New claim 23 should accordingly be allowable in the application.

Claim 18

The claim, indicating as allowable if rewritten independently, has been amended to include the limitations of claim 17, the only claim from which it depended. It follows that claim 18 is now allowable in the application.

Claims 21 and 22.

Both were rejected on a theory of Official Recognition, but both claims are now made dependent from claim 18, and so should both be allowable with claim 18, which is now independent.

Claims 5, 6, 10, 11, 14, 15 and 18-20 were objected to as being dependent upon a rejected base claim, and are submitted now to be allowable in the application.

Summary

The references cited but not applied are not believed to be more relevant than the art applied.

Accompanying this response is a Petition for Acceptance of Color Drawings with 3 sets of amended drawing sheets.

In view of the arguments made, further consideration of the application and a notice of allowance are respectfully requested.

While it is believed that the foregoing satisfies all issues of patentability, and resolves any remaining issues, if Examiner believes there is any remaining issue which could be readily resolved or other action could be taken to advance this application, such as Examiner's amendment, it is requested that Examiner please telephone the undersigned Peter S. Gilster. If necessary to effect a timely response, this paper should be considered as a petition for extension of time of length sufficient to be considered timely.

Any fees required beyond payment submitted herewith are authorized to be charged to Deposit Account No. 07-1985.

Respectfully submitted,

22 Sept. 2004
Date

Peter S. Gilster, Reg. No. 25,337
Greensfelder, Hemker & Gale, PC
10 S. Broadway, 20th Floor
St. Louis, Missouri 63102
314-345-4741 Direct telephone
314-241-9090 General telephone
314-345-4704 Facsimile
Attorneys for Applicant
Customer Number: 22807

Attachments: Declaration of Maurice V. Garoutte Under 37 CFR §1.132
and Appendix thereto
Petition for Acceptance of Color Drawings
3 sets of color drawing sheets
Transmittal with Fee Authorization
with Certification of Mailing

PSG/KMB